What is claimed is:

1. A seal element for providing a seal between two components in a downhole tool, the seal element comprising:

a polymer host material; and

a nanomaterial integrated with the polymer host material to form a nanocomposite material.

2. The seal element as recited in claim 1 wherein the seal element comprises a seal selected from the group consisting of O-ring seals, D-seals, T-seals, V-seals, X-seals, flat seals, lip seals, back-up rings, bonded seals and packing elements.

3. The seal element as recited in claim 1 wherein the polymer host material is selected from the group consisting of elastomers, thermosets and thermoplastics.

4. The seal element as recited in claim 1 wherein the polymer host material comprises an elastomer selected from the group consisting of NBR, XNBR, HNBR, XHNBR, HXNBR, HSN, EPR, EPDM, FEPM, FKM and FEKM.

5. The seal element as recited in claim 1 wherein the polymer host material comprises a thermoplastic selected from the group consisting of polphenylene sulfides, polyetheretherketones and tetrafluoroethylenes.

6. The seal element as recited in claim 1 wherein the nanocomposite material further comprising a reinforcement material selected from the group consisting of powder materials, fiber reinforcement materials and metal reinforcement materials.

7. The seal element as recited in claim 1 wherein the nanomaterial further comprises nanoparticles having a scale in the range of approximately 0.1 nanometer to approximately 500 nanometers.

8. The seal element as recited in claim 1 wherein the nanomaterial is selected from the group consisting of metal oxides, nanoclays and carbon nanostructures.

9. The seal element as recited in claim 1 wherein the nanomaterial further comprises silicon.

10. The seal element as recited in claim 1 wherein the nanomaterial is selected from the group consisting of polysilane resins, polycarbosilane resins, polysilsesquioxane resins and polyhedral oligomeric silsesquioxane resins.

11. The seal element as recited in claim 1 wherein the polymer host material and the nanomaterial have interfacial interactions selected from the group consisting of copolymerization, crystallization, van der Waals interactions and cross-linking interactions.

12. A downhole tool comprising:

a first component having a groove;

a second component positioned relative to the first component forming a gap therebetween; and

a seal element positioned in the groove and extending across the gap into sealing contact with the second component, the seal element comprising a nanocomposite material.

13. The downhole tool as recited in claim 12 wherein the seal element is selected from the group consisting of O-ring seals, D-seals, T-seals, V-seals, X-seals, flat seals and lip seals.

14. The downhole tool as recited in claim 12 wherein the nanocomposite material further comprises a polymer host material and a plurality of nanostructures.

15. The downhole tool as recited in claim 14 wherein the polymer host material further comprises an elastomer.

16. The downhole tool as recited in claim 15 wherein the elastomer is selected from the group consisting of NBR, XNBR, HNBR, XHNBR, HXNBR, HSN, EPR, EPDM, FEPM, FKM and FEKM.

17. The downhole tool as recited in claim 14 wherein the nanostructures further comprise nanoparticles having a scale in the range of approximately 0.1 nanometer to approximately 500 nanometers.

18. The downhole tool as recited in claim 14 wherein the nanostructures further comprise a material selected from the group consisting of metal oxides, nanoclays and carbon nanostructures.

19. The downhole tool as recited in claim 14 wherein the nanostructures further comprise silicon.

20. The downhole tool as recited in claim 14 wherein the nanostructures are selected from the group consisting of polysilane resins, polycarbosilane resins, polysilsesquioxane resins and polyhedral oligomeric silsesquioxane resins.

21. The downhole tool as recited in claim 14 wherein the polymer host material and the nanostructures have interfacial interactions selected from the group consisting of copolymerization, crystallization, van der Waals interactions and cross-linking interactions.

22. The downhole tool as recited in claim 12 wherein the first component is stationary relative the second component when the downhole tool is in an operational configuration.

23. The downhole tool as recited in claim 12 wherein the first component and the second component move relative to one another when the downhole tool is in an operational configuration.

24. The downhole tool as recited in claim 23 wherein the first component and the second component move translationally relative to one another when the downhole tool is in the operational configuration.

25. The downhole tool as recited in claim 23 wherein the first component and the second component move rotationally relative to one another when the downhole tool is in the operational configuration.

26. The downhole tool as recited in claim 12 wherein the first component and the second component are tubular components.

27. The downhole tool as recited in claim 12 wherein the first component is positioned interiorly of the second component.

28. The downhole tool as recited in claim 12 wherein the first component is positioned exteriorly of the second component.

29. The downhole tool as recited in claim 12 wherein the first component and the second component form a portion of a device selected from the group consisting of drill bits, mud motors, flow control devices, safety devices, valves, sliding sleeves, telemetry equipment, perforating guns, testing devices and pumps.

30. A seal assembly for providing a seal in a wellbore annulus, the seal assembly comprising:

a generally tubular mandrel; and

a seal element positioned exteriorly of the mandrel, the seal element operable to substantially prevent fluid flow in the wellbore annulus when the seal assembly is in a sealing configuation, the seal element comprising a nanocomposite material.

31. The seal assembly as recited in claim 30 wherein the nanocomposite material further comprises a polymer host material and a plurality of nanostructures.

32. The seal assembly as recited in claim 31 wherein the polymer host material further comprises an elastomer.

33. The seal assembly as recited in claim 32 wherein the elastomer is selected from the group consisting of NBR, XNBR, HNBR, XHNBR, HXNBR, HSN, EPR, EPDM, FEPM, FKM and FEKM.

34. The seal assembly as recited in claim 31 wherein the nanostructures further comprise nanoparticles having a scale in the range of approximately 0.1 nanometer to approximately 500 nanometers.

35. The seal assembly as recited in claim 31 wherein the nanostructures further comprise a material selected from the group consisting of metal oxides, nanoclays and carbon nanostructures.

36. The seal assembly as recited in claim 31 wherein the nanostructures further comprise silicon.

37. The seal assembly as recited in claim 31 wherein the nanostructures are selected from the group consisting of polysilane resins, polycarbosilane resins, polysilsesquioxane resins and polyhedral oligomeric silsesquioxane resins.

38. The seal assembly as recited in claim 31 wherein the polymer host material and the nanostructures have interfacial interactions selected from the group consisting of copolymerization, crystallization, van der Waals interactions and cross-linking interactions.